TRANSMITTER FOR TRANSMITTING DISCOVERY SIGNALS, A RECEIVER AND METHODS THEREIN

TECHNICAL FIELD

Embodiments herein relate to a transmitter, a receiver and methods therein. In particular, embodiments herein relate to the transmittal of discovery signals to the receiver.

BACKGROUND

Communication devices such as User Equipments (UE) are enabled to communicate wirelessly in a radio communications system, sometimes also referred to as a radio communications network, a mobile communication system, a wireless communications network, a wireless communication system, a cellular radio system or a cellular system. The communication may be performed e.g. between two user equipments, between a user equipment and a regular telephone and/or between a user equipment and a server via a Radio Access Network (RAN) and possibly one or more core networks, comprised within the wireless communications network.

User equipment are also known as e.g. mobile terminals, wireless terminals and/or mobile stations, mobile telephones, cellular telephones, or laptops with wireless capability, just to mention some examples. The user equipments in the present context may be, for example, portable, pocket-storable, hand-held, computer-comprised, or vehicle-mounted mobile devices, enabled to communicate voice and/or data, via the RAN, with another entity.

The wireless communications network covers a geographical area which is divided into cell areas, wherein each cell area being served by a network node such as a Base Station (BS), e.g. a Radio Base Station (RBS), which sometimes may be referred to as e.g. eNB, eNodeB, NodeB, B node, or BTS (Base Transceiver Station), depending on the technology and terminology used. The base stations may be of different classes such as e.g. macro eNodeB, home eNodeB or pico base station, based on transmission power and thereby also cell size. A cell is the geographical area where radio coverage is provided by the base station at a base station site. One base station, situated on the base station site, may serve one or several cells. Further, each base station may support one or several radio access and communication technologies. The base stations communicate over the radio interface operating on radio frequencies with the user equipments within range of the base stations.

In some RANs, several base stations may be connected, e.g. by landlines or microwave, to a radio network controller, e.g. a Radio Network Controller (RNC) in Universal Mobile Telecommunications System (UMTS), and/or to each other. The radio network controller, also sometimes termed a Base Station Controller (BSC) e.g. in GSM, may supervise and coordinate various activities of the plural base stations connected thereto. GSM is an abbreviation for Global System for Mobile Communications (originally: GroupeSpécial Mobile).

In the context of this disclosure, the expression Downlink (DL) is used for the transmission path from the base station to the user equipment. The expression Uplink (UL) is used for the transmission path in the opposite direction i.e. from the user equipment to the base station.

In 3rd Generation Partnership Project (3GPP) Long Term Evolution (LTE), base stations, which may be referred to as eNodeBs or even eNBs, may be directly connected to one or more core networks.

UMTS is a third generation mobile communication system, which evolved from the GSM, and is intended to provide improved mobile communication services based on Wideband Code Division Multiple Access (WCDMA) access technology. UMTS Terrestrial Radio Access Network (UTRAN) is essentially a radio access network using wideband code division multiple access for user equipments. The 3GPP has undertaken to evolve further the UTRAN and GSM based radio access network technologies.

According to 3GPP/GERAN, a user equipment has a multi-slot class, which determines the maximum transfer rate in the uplink and downlink direction, GERAN is an abbreviation for GSM EDGE Radio Access Network. EDGE is further an abbreviation for Enhanced Data rates for GSM Evolution.

The past 30 years have seen a tremendous improvement in the state of Information and Communication Technologies (ICT), formally led by the Computing and the Telecommunications industries. This improvement is most felt in the increase in global Internet traffic, which has been conservatively predicted to reach a ten-fold growth from 2010 levels by 2016. Other forecasts by Cisco predict an increase in traffic of as much as a 92% cumulative annual growth rate; this amounts to a 700-fold increase in traffic by 2020.

A majority of this traffic growth is expected to come from the increased consumption of video on mobile networks, as well as a net increase in subscribers transitioning to mobile broadband even as the fixed and mobile networks converge to provide end-user experience that is indistinguishable in many environments. Added to this, it has been predicted that the mobile broadband industry will get most of its growth in the number of connections from the widespread introduction of Machine Type Communication (MTC) devices that will drive the Machine-to-Machine (M2M) market for applications from diverse industries such as Utilities (e.g. Smart Grid), Automotive (e.g. Intelligent Transportation), Health care. Apart from these industries, the broad area of Industrial Automation is expected to create new business opportunities in a variety of industries such as Agriculture, Mining and Exploration, Oil and Natural Gas Distribution, Residential and Building Automation etc. Estimates of the number of devices vary widely from our own declamation of an increase from 5 billion subscriptions to 50 billion connected devices.

One key development that is inevitable is a merging of fixed and wireless networks in what has been termed as the Fixed Mobile Convergence (FMC).

There is still some scope for a part of the predicted traffic increase to happen due to network build out in areas of the world not covered by mobile broadband. However, it is also true that much of the increase in data traffic will happen based on the kind of activities people engage in over the Internet, such as the transition of video services from broadcast networks to online video sources. This leads to our conviction that the bulk of Internet traffic increase will happen in areas that are already served by cellular networks.

Table 1 below is a generational classification of broadband cellular technologies. The table uses an accepted and correct technical classification, while it is acknowledged that industry and media may often use a more sensational approach to distinguishing a generation. With the introduction of LTE and all indications of LTE being the sole